

REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-18 are currently pending. Claims 1-18 have been amended by the present amendment. The changes to the claims are supported by the originally filed specification and do not add new matter.

In the outstanding Office Action, Figure 10 was objected to as failing to include a legend such as "Prior Art"; the claims were objected to regarding various informalities; Claims 2, 4, and 6 were rejected under 35 U.S.C. § 112, second paragraph, as being "difficult to understand" and "grammatically awkward"; Claims 1 and 7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over "the admitted prior art in Figure 10" (hereinafter "the Background Art") in view of U.S. Patent No. 5,706,313 to Blasiak et al. (hereinafter "the '313 patent") and U.S. Patent No. 5,844,946 to Nagayasu (hereinafter "the '946 patent"); Claims 3, 5, 9, and 11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the Background Art, the '313 patent, and the '946 patent, further in view of U.S. Patent No. 6,269,124 B1 to Nagayasu et al. (hereinafter "the '124 patent"); Claims 2, 4, and 6 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the Background Art, the '313 patent, and the '946 patent, further in view of U.S. Patent No. 5,335,250 to Dent et al. (hereinafter "the '250 patent"); Claims 8, 13, and 14 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,574,283 B1 to Sakoda et al. (hereinafter "the '283 patent") in view of the Background Art, the '313 patent, and the '946 patent; and Claims 10, 12, and 15-18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the '283 patent in view of the Background Art, the '313 patent, the '946 patent, and the '124 patent.

Regarding the objection to the Drawings, submitted herewith is a Letter Submitting Replacement Drawing Sheets, along with an amended copy of Figure 10. Figure 10 has been amended to include the legend "Background Art." Accordingly, the objection to the Drawings is believed to have been overcome.

Regarding the objection to the claims, the claims have been amended in the manner suggested in the Office Action, with one exception. Claims 8, 10, and 12 have not been amended to change the phrase "a predetermined algorithm" to "the predetermined algorithm." Applicants respectfully submit that such a change is not justified since "a predetermined algorithm" is not previously recited in those claims. Accordingly, Applicants respectfully traverse the objection to the claims regarding the phrase "a predetermined algorithm." However, Applicants respectfully submit that the remaining objections to the claims are rendered moot by the present amendment to the claims. Accordingly, the objections to the claims are believed to have been overcome.

Applicants respectfully submit that the rejection of Claims 2, 4, and 6 under 35 U.S.C. § 112, second paragraph, are rendered moot by the present amendment to those claims. Claims 2, 4, and 6 have been amended to clarify the functioning of the soft decision demodulating estimation unit.

Amended Claim 1 is directed to a demodulator, comprising: (1) a multiple differential phase detected signal output unit configured to calculate phase differences between a received signal and previously received signals of 1, 2, ..., N symbols (where N is an integer greater than 2) so as to output 1, 2, ..., N symbol differential phase detected signals; and (2) a soft decision demodulated data estimating unit configured to estimate a transmitted differential phase sequence according to the 1, 2, ..., N symbol differential phase detected signals using a trellis diagram representing transitions of differential phase states of transmitted signals and a Viterbi algorithm, and to estimate soft decision demodulated data

according to the estimated transmitted differential phase sequence and a survival path metric that transits into each state on the trellis diagram. Further, Claim 1 has been amended to clarify that the soft decision demodulated data are estimated as the product of hard decision data and reliability information. The changes to Claim 1 are supported by the originally filed specification and do not add new matter.

Applicants respectfully submit that the rejection of Claim 1 is rendered moot by the present amendment to that claim.

Regarding the rejection of Claim 1, the Office Action asserts that the Background Art discloses everything in Claim 1 with the exception of the soft decision demodulating data estimating unit, and relies on the '313 and '946 patents to remedy that deficiency.

The Background Art is directed to the multiple differential phase detector 500 as shown in Figure 10. However, as admitted in the Office Action, the Background Art fails to disclose the soft decision demodulated data estimating unit recited in amended Claim 1.

The '313 patent is directed to a soft decision digital communications method and apparatus for decoding a coherent differentially encoded multilevel phase-shift keyed (DEPSK) modulated signal. The '313 patent discloses that the metric computer 201 generates a soft decision metric corresponding to the coherent DEPSK modulated signal, which is then outputted to a forward error correction (FEC) decoder 107. However, Applicants respectfully submit that the '313 patent fails to disclose that soft decision demodulated data are estimated as the product of hard decision data and reliability information, as recited in amended Claim 1.

The '946 patent is directed to a soft decision receiver and decoder for digital communication. The '946 patent discloses a soft decision value producing circuit that performs a process not based on path metrics, but based on survivor metrics. However, Applicants respectfully submit that the '946 patent fails to disclose that the soft decision

demodulated data are estimated as the product of hard decision data and reliability information, as recited in amended Claim 1.

Accordingly, no matter how the teachings of the Background Art, the '313 patent, and the '946 patent are combined, the combination does not teach or suggest soft decision demodulated data being estimated as a product of hard decision data and reliability information, as recited in amended Claim 1. Accordingly, Applicants respectfully submit that amended Claim 1 patentably defines over any proper combination of the Background Art, the '313 patent, and the '946 patent.

Claim 7 recites limitations analogous to limitations recited in Claim 1. Moreover, Claim 7 has been amended in a manner analogous to the amendment to Claim 1. Accordingly, for the reasons stated above for the patentability of Claim 1, Applicants respectfully submit that the rejection of Claim 7 is rendered moot by the present amendment to that claim.

Applicants respectfully submit that the rejection of Claims 3, 5, 9, and 11 under 35 U.S.C. § 103(a) as rendered moot by the present amendment to those claims. Claims 3, 5, 9, and 11 have been amended to add the limitation added to Claim 1. However, as discussed above, the Background Art, the '313 patent, and the '946 patent each fail to disclose that soft decision demodulated data are estimated as a product of hard decision data and reliability information.

The '124 patent is directed to a data transmission system, receiver, and recording medium in which a soft decision circuit 18 outputs soft decision data so as to decrease the number of different bits between the pseudo transmission signals and the received signals, and the received data are generated based on the soft decision data. However, Applicants respectfully submit that the '124 patent fails to cure the deficiencies of the Background Art, the '313 patent, and the '946 patent, as discussed above. In particular, the '124 patent fails to

disclose that soft decision demodulated data are estimated as the product of hard decision data and reliability information. Accordingly, Applicants respectfully submit that Claims 3, 5, 9, and 11 patentably define over any proper combination of the Background Art, the '313 patent, the '946 patent, and the '124 patent.

Regarding the rejection of dependent Claims 2, 4, and 6 under 35 U.S.C. § 103(a) Applicants respectfully submit that the '250 patent fails to remedy the deficiencies of the '313 patent, the '946 patent, and the Background Art, as discussed above. Accordingly, Applicants respectfully submit that the rejections of dependent Claims 2, 4, and 6 are rendered moot by the present amendment to Claims 1, 3, and 5, respectively.

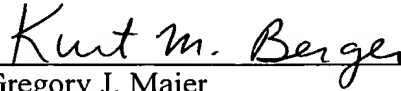
Applicants respectfully submit that the rejection of independent Claims 8, 10, 12, and 14-18 are rendered moot by the present amendment to those claims. Claims 8, 10, 12, and 14-18 have been amended to clarify that the soft decision demodulated data are estimated as a product of hard decision data and reliability information. Further, as discussed above, the Background Art, the '313 patent, the '946 patent, and the '124 patent each fail to disclose that the soft decision demodulated data are estimated as the product of hard decision data and reliability information. Further, Applicants respectfully submit that the '283 patent fails to remedy the deficiencies of the other applied references, as discussed above. Accordingly, no matter how the applied references are combined, the combination does not teach or suggest that soft decision demodulated data are estimated as a product of hard decision data and reliability information. Accordingly, Applicants respectfully submit that Claims 8, 10, 12-18 patentably define over any proper combination of the cited references.

Thus, it is respectfully submitted that independent Claims 1, 3, 5, and 7-18 (and all associated dependent claims) patentably define over any proper combination of the Background Art and the '313, '946, '250, '124, and '283 patents.

Consequently, in view of the present amendment and in light of the above discussion, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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